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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,793	03/24/2004	Ervin T. Hill	42P18020	6018

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Michael A. Bernadicou
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
Seventh Floor
12400 Wilshire Boulevard
Los Angeles, CA 90025

EXAMINER

YEVSIKOV, VICTOR V

ART UNIT PAPER NUMBER

2891

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

HA

Office Action Summary

Application No.

10/808,793

Applicant(s)

HILL ET AL.

Examiner

Victor V. Yevsikov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/24/4</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 8,9, and 10, 18 and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Chowdhury (US 2004/0110387 A1).

With respect to claims 1 and 10 Chowdhury teaches a method comprising:

forming a thin film stack (or flash memory gate stack) on a substrate 10, wherein the thin film stack includes at least a polysilicon layer 105 and an oxide layer 102;

forming a hardmask layer 135 on the thin film stack 125;

forming an anti-reflective coating (ARC) layer 145 on the hardmask layer 135;

wherein the ARC layer comprises a different material (SiN_2 , SiON , (§ 0034)) than the hardmask layer (WN , TaN , NbN , TiN , (§ 0022));

patterning the ARC layer;

etching the hardmask layer using the patterned ARC layer as a mask; and

etching the thin film stack using the hardmask layer as a mask; and wherein:

Reference: figs. 2 - 9 with corresponding text.

With respect to claims 8, 9,18 and 19 Chowdhury teaches a method wherein

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the ARC layer is removed during the etching of the thin film stack;
removing the hardmask material from the thin film stack (figs 8 and 9 with
corresponding text).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all
obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148
USPQ 459 (1966), that are applied for establishing a background for determining
obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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6. Claims 2 –5 and 11,12, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chowdhury (US 2004/0110387 A1).

These claims are rejected as being prima facie obvious without showing that the claimed ranges (concentration, temperature, process time) achieve unexpected results relative to the prior art range.

In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA 1980) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

7. Claims 6 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chowdhury In view of Mui et al. (US 2005/0085090 A1).

With respect to claims 6 and 16 Chowdhury teaches the features detailed previously but lack a discussion on method wherein the hardmask layer comprises amorphous carbon.

However, Mui teach the method wherein the hardmask layer comprises amorphous carbon (§ 0025).

Therefore, it would have been obvious to one of ordinary skill in the art to use method of forming hardmask layer as taught by Chowdhury / Mui as is useful in the optimizing on the field of semiconductor processing.

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chowdhury In view of Wang et al. (US 6,509,237 B2).

With respect to claim 13 Chowdhury teaches the features detailed previously but lack a discussion on method wherein the flash memory gate stack is comprised of a gate dielectric layer, a floating gate layer, an inter-electrode dielectric layer, and a control gate electrode layer.

However, Wang ('237) teach the method wherein gate stack 14 is a flash memory gate stack is shown comprising a control gate 16 and a floating gate 18, with insulating layers 19 separating control gate 16 from floating gate 18 and floating gate 18 from substrate 12 (col.2, lines 43-56, fig.1a).

Therefore, it would have been obvious to one of ordinary skill in the art to use method of forming flash memory gate stack as taught by Chowdhury / Wang as is useful in the optimizing on the field of semiconductor processing.

9. Claims 7 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chowdhury in view of Ying et al. (US 2004/0209476 A1).

With respect to claims 7 and 17 Chowdhury teaches the features detailed previously but lack a discussion on method wherein the hardmask layer comprises Applied Materials® Advanced Patterning Film™.

However, Ying teach the method wherein the hardmask layer comprises Applied Materials@ Advanced Patterning Film™ (§0027).

Therefore, it would have been obvious to one of ordinary skill in the art to use method of forming hardmask as taught by Chowdhury / Ying as is useful in the optimizing on the field of semiconductor processing.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor Yevsikov whose telephone number is (571) 272-1910. The examiner can normally be reached on Monday –Thursdays 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, examiner's supervisor, William B. Baumeister, can be reached on (571) 272-1722. The fax phone numbers for the organization where this application or processing is assigned is (703) 873-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished application is available through Private PAIR only. For more information

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about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Victor Yevsikov

Examiner
Art Unit 2891

April 1, 2006

Asok Kumar Sarkar
4/3/06

ASOK K. SARKAR
PRIMARY EXAMINER